

Air Toxics

Background

Air pollutants can be divided into two categories, criteria pollutants and air toxics. Criteria pollutants are a group of six pollutants for which the EPA has set National Ambient Air Quality Standards (NAAQS). These six pollutants (ozone, sulfur dioxide, carbon monoxide, nitrogen dioxide, particulate matter, and lead) are regulated throughout the country, and the concentrations of these pollutants in air are extensively monitored and tracked for compliance with the air quality standards.

Air toxics are pollutants that are likely to be emitted into the air in quantities that are large enough to cause adverse health effects, including lung irritation, birth defects and cancer. There are no national air quality standards for these pollutants, but in 1990 the U.S. Congress directed the EPA to begin to address a list of almost 200 of these air toxics by developing control technology standards. This particular list of air toxics is known as Hazardous Air Pollutants (HAPs).

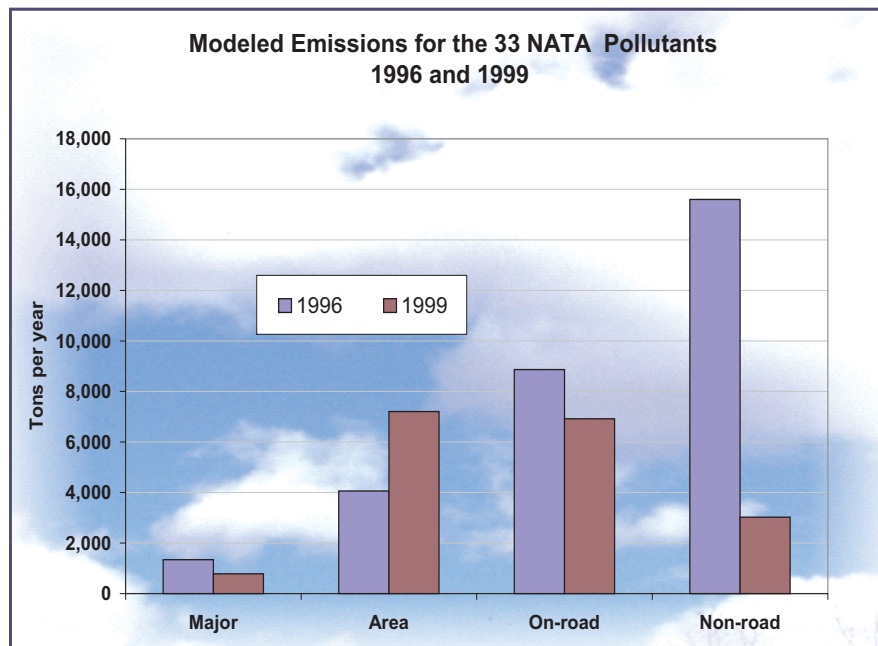
Exposure to air toxics is a widespread problem that occurs throughout the entire state. These pollutants come from a wide variety of sources, including traditional industrial and utility sources, smaller manufacturing and commercial sources, mobile sources (such as cars, trucks and buses), residential activities (such as oil burning for home heating, and painting houses), and construction equipment.

Status and Trends

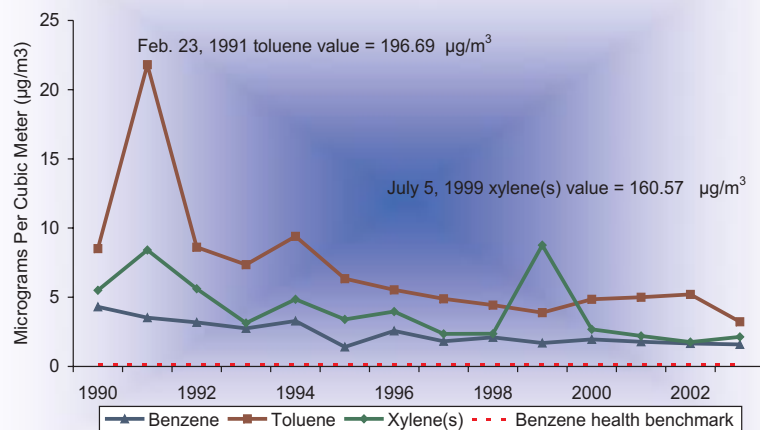
Exposure to air toxics can be expressed in a number of ways. For example, emissions can be estimated and tracked from a variety of sources, both stationary and mobile, and used as a surrogate for exposure. Emissions data can be gathered from air permits, facility reports and a variety of other sources. The levels of toxics in the air can be measured using monitors, but the measurements are specific to the location of the monitor and to the time during which the sampling took place. Modeling also can be used to extrapolate from known emissions to concentrations in the air. Risk-assessment methods, such as those used in EPA's National Air Toxics Assessment (NATA), then can be applied to model results to identify the pollutants of greatest concern.¹ When the 1999 NATA results are released later this year, DEP will be able to get a sense of the trends in risk related to air toxics exposures in New Jersey.

Reduction in emissions of air toxics

An air toxics inventory has been compiled every three years in support of NATA. The figure below shows how emissions (grouped by broad-source categories) have changed in New Jersey in the last two inventories (for 1996 and 1999). The general reduction in air toxic emissions from major sources (such as chemical plants and refineries) and from on-road sources (cars, trucks and buses) most likely is due to improvements in air-pollution controls. Changes in the other two categories probably occurred because there have been significant modifications to the way the inventory has been compiled. By the end of 2005, the 2002 air toxics inventory will be finalized using methods that are more consistent with the 1999 inventory. That comparison will provide more insight into how emissions have been changing.



Measured Benzene, Toluene, and Xylene Concentrations at Camden, NJ; Annual Averages



Outlook and Implications

DEP's analysis of the state and county average air toxics concentrations generated by NATA indicates that 19 of the chemicals were predicted to exceed their health benchmarks in one or more counties in 1996. Eighteen of these are cancer-causing chemicals, and one, acrolein, is not carcinogenic. Predicted concentrations of these 19 pollutants vary around the state, depending on the type of sources that emit them. This is summarized in the table below.

1996 NATA - 19 Toxics of Concern (in order of pervasiveness)

Pollutant of Concern	Extent	Primary Source of Emissions
1 Benzene	Statewide	Mobile; Background Concentration
2 1,3-Butadiene	Statewide	Onroad Mobile
3 Carbon tetrachloride	Statewide	Background Concentration
4 Chloroform	Statewide	Background Concentration; Point
5 Diesel particulate matter	Statewide	Nonroad Mobile
6 Ethylene dibromide	Statewide	Background Concentration
7 Ethylene dichloride	Statewide	Background Concentration
8 Formaldehyde	Statewide	Mobile
9 Acrolein	20 Counties	Mobile
10 Polycyclic organic matter	20 Counties	Area
11 Chromium compounds	17 Counties	Area
12 Acetaldehyde	13 Counties	Mobile
13 Perchloroethylene	11 Counties	Area; Background Concentration
14 7-PAH	5 Counties	Area
15 Arsenic compounds	4 Counties	Area; Point
16 Cadmium compounds	4 Counties	Area
17 Nickel compounds	4 Counties	Area
18 Beryllium compounds	1 County	Area
19 Hydrazine	1 County	Area

Improvements in ambient air quality

DEP has been operating an air toxics monitoring site in Camden since 1989. Thirteen of the substances measured there were included in the 1996 NATA. The levels predicted by NATA for these 13 substances compare very well to what was measured at NJ's Camden site in 1996. The concentrations of the 13 pollutants measured at the Camden site from 1989 to 1996 have been substantially reduced. The graph below illustrates this showing the changes in benzene, toluene and xylene levels from 1989 to 2002.

Although there is a downward trend for air toxics in Camden, many of them are still above the DEP health benchmarks, including the carcinogen, benzene.

Based on the results of the NATA 1996 analysis, the DEP identified several strategies that could lead to reduction in exposure to air toxics in our state. These initiatives are listed below.

AIR TOXICS REDUCTION INITIATIVES

1. Reduce particulate emissions from existing diesel engines.
2. Set tougher permit limits for new stationary diesel engines.
3. Begin pilot program to evaluate local risk levels in South Camden.
4. Propose new regulations to reduce emissions of Volatile Organic Compounds (including many air toxics) from the use of common products and from many small industrial activities.
5. Investigate facilities identified by NATA as having a high local impact on risk.
6. Carry out more facility-wide risk assessments to identify local areas where relatively high exposures to toxics may exist.

Progress has been made in addressing each of these initiatives. The diesel vehicle initiative was launched in 2004, and stack tests are being done on stationary diesel engines to better monitor their emissions. The Camden Waterfront South pilot project is complete (www.nj.gov/dep/ej/airtoxics.html), and a final report will be issued by the fall of 2005. Changes to the DEP rules governing emissions of VOCs were adopted in April of 2004 in order to reduce emissions from use of consumer products and many small sources of toxic substances. One facility discontinued use of hydrazine, which is a highly toxic substance that may be carcinogenic, as a result of a joint effort between the enforcement and air quality evaluation staff at DEP. In addition, approximately a dozen facility-wide risk assessments were carried out by the Bureau of Air Quality Evaluation in 2004.

More Information

Air Toxics Overview: www.nj.gov/dep/airtoxics
USEPA Criteria Pollutants: www.epa.gov/oar/oaqps/cleanair.html
USEPA Hazardous Air Pollutants (HAPs): www.epa.gov/ttn/atw
Diesel Initiative: www.stopthesoot.org/
Camden Waterfront South: www.nj.gov/dep/ej/airtoxics.html
VOC Regulations: www.state.nj.us/dep/aqm/rules.htm
USEPA, NATA: www.epa.gov/ttn/atw/nata

References

¹ NATA is a national assessment of 33 air pollutants that includes the compilation of an inventory of air toxics emissions from outdoor sources, an estimation of the concentrations of air toxics throughout the United States, and an estimation of public exposure and potential health risk. It was developed as a tool for EPA to carry out its obligation, under the Clean Air Act Amendments of 1990, to determine a national strategy to reduce emissions of and exposure to air toxics, particularly in urban areas. In 2002, the EPA released the results from the 1996 inventory, which provided a comprehensive picture of the sources of air toxics and their distribution around the country.